RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole # 52-04-03

Borehole Information

Farm : TY	**Tank :** TY-104	**Site Number :** 299-W10-83
N-Coord : 42,544	**W-Coord :** 75,912	**TOC Elevation :** 672.00
Water Level, ft :	**Date Drilled :** 6/30/1952	

Casing Record

Type : Steel-welded	Thickness, in. : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 146	

Borehole Notes:

This borehole was drilled in June 1952 to a depth of 150 ft. The borehole was started with a 22-ft length of surface casing of unknown diameter with 6-in. casing installed between the ground surface and the bottom of the borehole. The casing was perforated between 40 and 100 ft using a staggered pattern of five holes per foot. The driller's log does not specify that the surface casing was removed or that grout was installed in any interval of the borehole.

The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

The top of the casing is the starting depth for the logs. The casing lip is about 0.5 ft below the surface grade inside a plastic valve box.

Equipment Information

Logging System : 2	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1995	**Calibration Reference :** GJPO-HAN-3	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number :	1	**Log Run Date :**	5/9/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	146.5	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	46.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	5/10/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	0.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	2.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

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Log Run Number :	3	**Log Run Date :**	5/10/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	2.5	**Counting Time, sec.:**	100	**L/R :** R	**Shield :** N
Finish Depth, ft. :	4.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	4	**Log Run Date :**	5/10/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	4.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	47.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Analysis Information

Analyst : H.D. Mac Lean

Data Processing Reference : P-GJPO-1787 Analysis Date : 2/6/1997

Analysis Notes :

This borehole was logged in four logging runs. Three separate logging runs were required to log one interval of the borehole that contained a zone of extremely high gamma-ray activity. The activity level in the depth interval between 2 and 3 ft saturated the detector; dead time in the interval exceeded 50 percent and the spectral intensities had to be extrapolated from abnormally short integration times (real time mode).

The pre- and post-survey field verification spectra for all logging runs passed the acceptance criteria for the peak shape and system efficiency, indicating that the logging system was operating within specifications. The energy calibration and peak-shape calibration from the field verification spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation. The energy calibration and peak shape calibration from the applicable pre- and post-survey verification spectra were transferred to the spectra acquired during the logging run. Negligible gain drift was experienced during the logging runs. It was not necessary to adjust the energy calibration to compensate for drift while processing logging spectra data to maintain proper peak identification.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The man-made radionuclides Cs-137 and Eu-154 were detected in this borehole. Cs-137 contamination was detected between the ground surface and a depth of 5.5 ft in concentrations ranging up to about 2,200 pCi/g. Cs-137 contamination was also detected from 16.5 to 18.5 ft in concentrations that ranged up to about 1 pCi/g, at depths of 45, 51, 55.5, and 65.5 ft, from 80.5 to 81 ft, at 92 ft, from 98 to 98.5 ft, and at 108 ft in concentrations that ranged from less than 0.2 pCi/g to about 0.5 pCi/g. Eu-154 concentrations were detected near the top of the borehole in association with a zone of high Cs-137 concentrations. The highest measured Eu-154 concentration was about 30 pCi/g at a depth of 2.5 ft.

The K-40 concentration values increase from a background of about 12 pCi/g above 47 ft to 18 pCi/g from 47 to 99 ft. The measured Th-232 and U-238 concentrations increase perceptibly below a depth of about 93 ft. The measured K-40 concentrations decrease from 6 to 8 pCi/g between 100 and 115 ft. A significant decrease in the measured Th-232 concentrations were also detected in this depth interval. The K-40 background changes from about 16 pCi/g above 115 ft to about 10 pCi/g below 130 ft. The measured U-238

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and Th-232 concentrations also decrease below the 130-ft depth.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank TY-104.

Log Plot Notes:

Separate log plots show the concentrations of the man-made radionuclide (Cs-137 and Eu-154) and the naturally occurring radionuclides (KUT). The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, in addition to the total gamma derived from the spectral data and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.